

Cambridge IGCSE™

DESIGN & TECHNOLOGY**0445/12**

Paper 1 Product Design

October/November 2024

MARK SCHEME

Maximum Mark: 50

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.

This document consists of **12** 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.

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.

Performance description tables

Each question contains some marks which are awarded using the following performance description tables.

Part (c)				
Communication of ideas			Suitable designs	
Mark	Performance description		Mark	Performance description
5–6	Ideas are communicated with precision and clarity through the use of accurate drawings and reasoned annotations linked to most of the requirements.		5–6	Creative solutions which fully meet the requirements. Designs showing most aspects of construction detail.
3–4	Ideas are displayed with some clarity through clear drawings supported by annotations referring to some of the requirements.		3–4	Sensible solutions that mostly meet the requirements. Designs with moderate construction detail.
1–2	Simple drawings and limited annotations show little understanding of the requirements.		1–2	Solutions do not meet many of the requirements. Simplistic designs with little construction detail.
0	No creditable response.		0	No creditable response

Part (e)				
Quality of drawing			Construction details	
Mark	Performance description		Mark	Performance Description
4	High standard of line quality, use of colour and proportions. Appropriate techniques used that show clearly all detail.		5–6	All construction detail clear with good annotations and/or additional detail drawings as necessary.
2–3	Good line quality, use of colour and proportions. Most of the detail presented.		3–4	Most construction may be obvious from overall views or with some annotation.
1	Poor line quality and proportions. Little detail presented.		1–2	A simplistic design; little or no detail of construction used.
0	No creditable response.		0	No creditable response.

Guidance on using the performance description tables

Marking should be positive, rewarding achievement where possible but clearly differentiating across the whole range of marks available. In approaching the assessment process, examiners should look at the work and then make a 'best fit' judgement as to which level statement it fits. In practice the work does not always match one level statement precisely so a judgement may need to be made between two or more level statements.

Once a 'best fit' level statement has been identified the following guide should be used to decide on a specific mark:

- Where the candidate's work **convincingly** meets the level statement, the highest mark should be awarded
- Where the candidate's work **adequately** meets the level statement, the most appropriate mark in the middle of the range should be awarded
- Where the candidate's work **just** meets the level statement, the lowest mark should be awarded.

Candidates answer **one** question, **either 1 or 2 or 3**.

Question	Answer	Marks	Guidance
1(a)	<p>Accept any four additional specification points – must be stable, must have flat surfaces to put food on, must be made from lightweight materials so it can be carried, material must be weather resistant, must match the style of the stools, easy to assemble, hold weight of food/cutlery/crockery, big enough for 3–5 people to eat... [1 × 4]</p> <p>Acceptable one word and short answers: foldable, collapsible, weatherproof, waterproof, cleanable, lightweight, durable, sturdy, low maintenance, rounded edges, adjustable, made from recyclable/recycled/sustainable materials...</p> <p>Any other valid response</p>	4	<p>Each specification point – 1 mark</p> <p>No repeats from question: used by families, used outdoors, used when the weather is nice, used with the stacking stools, take up as little space as possible (compact) and have a handle for carrying.</p> <p>Only accept unqualified answers if relevant to this specific design problem, not generic answers such as safe, nice, cheap, aesthetic, strong, portable, moveable, ergonomic, stackable, easy to store, environmentally friendly, recyclable... unless qualified.</p>

Question	Answer	Marks	Guidance
1(b)	<p>Accept drawings of any two methods of reducing the overall size of a product when not in use – legs fold under, fold in half, telescopic legs, removable legs, legs clip to underside of table, hinges, slotting joints and fixings, magnets, screw fittings, KD fittings... [2 × 2]</p> <p>If the method is not clear, for example a fold line labelled fold, award one mark rather than two.</p> <p>Two applications of the same method, for example folding the legs with a butt hinge and a folding the top with a butt hinge, award a maximum of three marks.</p> <p>Any other valid response</p>	4	<p>Maximum of 2 marks for each response: Appropriate method sketched – 1 mark Appropriate notes – 1 mark</p>
1(c)	<p>Any three suitable ideas.</p> <p>Award up to 6 marks for communication of ideas using the ‘Communication of ideas’ table.</p> <p>Award up to 6 marks for suitable designs using the ‘Suitable designs’ table.</p>	12	<p>At least three different ideas for maximum marks. Pro rata if fewer.</p>
1(d)	<p>Award up to 6 marks for evaluation of the ideas:</p> <p>Evaluation [2 × 3] e.g. Advantage + disadvantage explained for each idea</p> <p>Selection [1] Justification - not single words, or generic terms such as the best, meets the specification or most suitable [1]</p>	8	<p>Simple descriptions or repeats of same points for each idea not rewarded. Specific not generic justification. Award maximum marks if only either advantage or disadvantage given for each as long as includes sophisticated reasoning.</p>

Question	Answer	Marks	Guidance
1(e)	<p>Award up to 4 marks for quality of drawing using the 'Quality of drawing' table.</p> <p>Award up to 2 marks for dimensions:</p> <p>2 or 3 overall dimensions only – 1 mark Additional detail dimensions – 1 mark</p> <p>Award up to 6 marks for construction detail using the 'Construction details' table.</p>	12	Additional detail dimensions might show thickness of materials, diameters, etc.
1(f)	<p>Accept any two suitable specific materials. [1 × 2]</p> <p>Accept any appropriate reason for choice of each material [1 × 2]</p>	4	<p>Each suitable specific material – 1 mark</p> <p>Generic terms such as wood, metal, plastic not accepted.</p> <p>Appropriate reason for each material – 1 mark</p> <p>Materials must be appropriate for the design shown in (e)</p>
1(g)	<p>Accept any suitable manufacturing method for a part of the solution. [1 × 1]</p> <p>Award up to 3 marks for description of process.</p> <p>Award up to 2 marks for names of tools, equipment or machines used.</p>	5	<p>Method must be appropriate for design in (e) and not just a stage in the making of a part of the solution</p> <p>Detailed description for 3 marks</p> <p>Basic marking out tools, such as pencil or rule, or just drawings of tools/equipment = 1 mark only</p>

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Question	Answer	Marks	Guidance
OR			
2(a)	<p>Accept any four additional specification points – able to see the shells in the compartments, should fold flat when empty, made from weather resistant materials, waterproof, have bright colours or images to attract a child’s attention, easy to assemble, easy to empty... [1 × 4]</p> <p>Acceptable one word and short answers: foldable (compact), weatherproof, waterproof, water resistant, heat resistant, easily cleanable, lightweight, easy to assemble, durable, recyclable, made from recycled/sustainable/recyclable materials, hold lots of shells (capacity), easily recognisable, holes for air circulation/ventilation, no sharp edges...</p> <p>Any other valid response</p>	4	<p>Each specification point – 1 mark No repeats from question: to collect shells, used on a beach, used by a child, made from a single piece of material, made from thin sheet material, have three compartments and have a handle for carrying.</p> <p>Only accept unqualified answers if relevant to this specific design problem, not generic answers such as safe, nice, cheap, strong, portable, moveable, aesthetic, adjustable... unless qualified.</p>
2(b)	<p>Accept drawings of any two temporary and/or permanent methods of joining thin sheet material – suitable adhesive, double sided tape, rivets, slot fasteners, screws...[2 × 2]</p> <p>Award marks for the method, the material does not need to be named. If the material is incorrectly named, do not awarded the second mark.</p> <p>If the method is not clear, award one mark rather than two.</p> <p>Two applications of the same method, for example gluing a butt joint made from different materials, award a maximum of three marks.</p> <p>Any other valid response</p>	4	<p>Maximum of 2 marks for each response: Appropriate method sketched – 1 mark Appropriate notes – 1 mar</p>

Question	Answer	Marks	Guidance
2(c)	<p>Any three suitable ideas.</p> <p>Award up to 6 marks for communication of ideas using the 'Communication of ideas' table.</p> <p>Award up to 6 marks for suitable designs using the 'Suitable designs' table.</p>	12	At least three different ideas for maximum marks. Pro rata if fewer.
2(d)	<p>Award up to 6 marks for evaluation of the ideas:</p> <p>Evaluation [2 × 3] e.g. Advantage + disadvantage explained for each idea</p> <p>Selection [1] Justification - not single words, or generic terms such as the best, meets the specification or most suitable [1]</p>	8	<p>Simple descriptions or repeats of same points for each idea not rewarded.</p> <p>Specific not generic justification.</p> <p>Award maximum marks if only either advantage or disadvantage given for each as long as includes sophisticated reasoning.</p>
2(e)	<p>Award up to 4 marks for quality of drawing using the 'Quality of drawing' table.</p> <p>Award up to 2 marks for dimensions:</p> <p>2 or 3 overall dimensions only – 1 mark Additional detail dimensions – 1 mark</p> <p>Award up to 6 marks for construction detail using the 'Construction details' table.</p>	12	Additional detail dimensions might show thickness of materials, diameters, etc.
2(f)	<p>Accept any two suitable specific materials. [1 × 2]</p> <p>Accept any appropriate reason for choice of each material [1 × 2]</p>	4	<p>Each suitable specific material – 1 mark</p> <p>Generic terms such as wood, metal, plastic not accepted.</p> <p>Appropriate reason for each material – 1 mark</p> <p>Materials must be appropriate for the design shown in (e)</p>

Question	Answer	Marks	Guidance
2(g)	Accept any suitable manufacturing process. [1 × 1] Award up to 3 marks for description of process. Award up to 2 marks for names of tools, equipment or machines used.	5	Process must be appropriate for design in (e) and not just a stage in the making of a part of the solution. Detailed description for 3 marks Basic marking out tools, such as pencil or rule, or just drawings of tools/equipment = 1 mark only

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Question	Answer	Marks	Guidance
OR			
3(a)	<p>Accept any four additional specification points – sound must appeal to young children, must be weatherproof, must be easy to maintain, must not present any health and safety issues, must have a variety of sounds to maintain interest, no small parts that might be swallowed... [1 × 4]</p> <p>Acceptable one word and short answers: weatherproof, waterproof, easily cleanable, easy to assemble, attractive, fun to use, durable, robust, made from recycled/sustainable/recyclable materials...</p> <p>Any other valid response</p>	4	<p>Each specification point – 1 mark</p> <p>No repeats from question: used by children, used in outdoor parks/public places, make a sound, powered by movement of children and not use an additional power source (battery).</p> <p>Only accept unqualified answers if relevant to this specific design problem, not generic answers such as safe, nice, cheap, strong, aesthetic, lightweight, portable... unless qualified</p>
3(b)	<p>Accept drawings of any two methods of using movement to make a sound – turning a handle, ringing a bell, jumping on steps rings a bell, squeezing a hooter, pulling a rope to sound a bell, blowing, windup spring, winding a handle to produce an electric current that powers a buzzer, air being forced through a hole, beads in a ball, must not have easily detachable parts... [2 × 2]</p> <p>Two applications of the same way, for example beads in a spherical ball and beads in a cube, award a maximum of three marks.</p>	4	<p>Maximum of 2 marks for each response: Appropriate method sketched – 1 mark Appropriate notes – 1 mark</p>
3(c)	<p>Any three suitable ideas.</p> <p>Award up to 6 marks for communication of ideas using the 'Communication of ideas' table.</p> <p>Award up to 6 marks for suitable designs using the 'Suitable designs' table.</p>	12	<p>At least three different ideas for maximum marks. Pro rata if fewer.</p>

Question	Answer	Marks	Guidance
3(d)	<p>Award up to 6 marks for evaluation of the ideas:</p> <p>Evaluation [2 × 3] e.g. Advantage + disadvantage explained for each idea</p> <p>Selection [1] Justification – not single words, or generic terms such as the best, meets the specification or most suitable [1]</p>	8	<p>Simple descriptions or repeats of same points for each idea not rewarded. Specific not generic justification. Award maximum marks if only either advantage or disadvantage given for each as long as includes sophisticated reasoning.</p>
3(e)	<p>Award up to 4 marks for quality of drawing using the 'Quality of drawing' table.</p> <p>Award up to 2 marks for dimensions:</p> <p>2 or 3 overall dimensions only – 1 mark Additional detail dimensions – 1 mark</p> <p>Award up to 6 marks for construction detail using the 'Construction details' table.</p>	12	<p>Additional detail dimensions might show thickness of materials, diameters, etc.</p>
3(f)	<p>Accept any two suitable specific materials. [1 × 2]</p> <p>Accept any appropriate reason for choice of each material [1 × 2]</p>	4	<p>Each suitable specific material – 1 mark Generic terms such as wood, metal, plastic not accepted. Appropriate reason for each material – 1 mark Materials must be appropriate for the design shown in (e)</p>
3(g)	<p>Accept any suitable manufacturing process. [1 × 1]</p> <p>Award up to 3 marks for description of process.</p> <p>Award up to 2 marks for names of tools, equipment or machines used.</p>	5	<p>Process must be appropriate for design in (e) and not just a stage in the making of a part of the solution. Detailed description for 3 marks Basic marking out tools, such as pencil or rule, or just drawings of tools/equipment = 1 mark only</p>