



Cambridge IGCSE™

DESIGN & TECHNOLOGY

0445/12

Paper 1 Product Design

October/November 2022

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

This document consists of **10** printed pages.

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.

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)	Accept any four additional specification points – size (large capacity to hold lots of toys, large enough to put the toys in such as the rocking horse) and proportion (wide base so it won't fall over, or compartments of different sizes), colour, style and fitting in with environment. Robust to withstand use, possible use as seat or other idea or other shape cause by cartoon character. Contain compartments or sections for different toys/games. Easy to clean and maintain, safety features like rounded corners etc. [1 × 4]	4	Each specification point – 1 mark No repeats from question – suitable for children, holds lots of toys or games, provide storage, based on a cartoon character, encourage children to put away toys or games... Only accept unqualified or one-word answers if relevant to this specific design problem such as stable (won't wobble), self-assembly, lightweight, easy to clean, durable, strong, flat packed, non-toxic finish, portable, moveable... Do not accept generic answers such as large, size, safe, aesthetic... Any other valid response
1(b)	Accept drawings of any two – short hinge, piano hinge, tee hinge. Sliding into a groove, rebate, zip, curtain track. Cranked or specialist hinge, kitchen cupboard style hinge. Pin and hole used for pivot point. Accept use of stay (hydraulic or manual). [2 × 2] Allow maximum marks for different types of hinge. Allow locks and catches. Same hinge on a door and a lid = 3 marks	4	Maximum of 2 marks for each drawing: Appropriate way (method) written (need not necessarily be the name) – 1 mark Clear drawing – 1 mark Any other valid response
1(c)	Any three suitable ideas. Award up to 6 marks for communication of ideas using the 'Communication of ideas' table. Award up to 6 marks for suitable designs using the 'Suitable designs' table.	12	At least three different ideas for maximum marks. Pro rata if fewer.
1(d)	Award up to 6 marks for evaluation of the ideas: Evaluation [2 × 3] e.g. Advantage + disadvantage explained for each idea Selection [1] Justification[1]	8	Simple 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 the response includes sophisticated reasoning.

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: 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)	Accept any suitable manufacturing process. [1 × 1]	1	Process must be appropriate for design in (e) .
	Award up to 3 marks for description of process.	3	Detailed description for 3 marks
	Award up to 2 marks for names of tools, equipment of machines used.	2	<p>Basic marking out tools, such as pencil or rule, or just drawings of tools/equipment = 1 mark only</p> <p>Not materials or resources such as PVA, glasspaper, screws...</p>
OR			

Question	Answer	Marks	Guidance
2(a)	Accept any four additional specification points – robust, it will be opened many times. Interesting to attract attention. Use of materials which will provide durable surface. Use of colours, textures and different fonts to communicate information. Materials which will wipe clean, thickness specified, type of card/paper (thickness, stiffness...) no sharp edges to cut fingers. [1 × 4]	4	Each specification point – 1 mark No repeats from question – for a birthday, include a cartoon characters, pop-up when opened, based on one of the given characters... Only accept unqualified or one-word answers if relevant to this specific design problem such as attractive, colourful, 3-dimensional, recyclable, non-toxic... Do not generic answers such as nice, safe, won't break, durable, robust, lightweight... Any other valid response
2(b)	Accept drawings of any two features – use of engineered card struts, use of rubber band/s, articulated when leaf/s of card are moved, floating layers, vee fold mechanisms... Accept manual lever to cause pop-up. [2 × 2]	4	Maximum of 2 marks for each drawing: Feature (named or notes) – 1 mark Clear drawing – 1 mark Any other valid response
2(c)	Any three suitable ideas. Award up to 6 marks for communication of ideas using the 'Communication of ideas' table. Award up to 6 marks for suitable designs using the 'Suitable designs' table.	12	At least three different ideas for maximum marks. Pro rata if fewer.
2(d)	Award up to 6 marks for evaluation of the ideas: Evaluation [2 × 3] e.g. Advantage + disadvantage explained for each idea Selection [1] Justification[1]	8	Simple 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 the response includes sophisticated reasoning.

Question	Answer	Marks	Guidance
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>Accept paper, card, foamboard, aluminium foil, brass for fastenings, balsa wood, beech lollipop sticks, veneers, vinyl but not woods such as teak and chipboard</p> <p>Appropriate reason for each material – 1 mark</p> <p>Materials must be appropriate for the design shown in (e)</p>
2(g)	Accept any suitable manufacturing process. [1 × 1]	1	Process must be appropriate for design in (e) .
	Award up to 3 marks for description of process	3	Detailed description for 3 marks
	Award up to 2 marks for names of tools, equipment of machines used.	2	Basic marking out tools, such as pencil or rule, or just drawings of tools/equipment = 1 mark only Not materials or resources such as PVA, glasspaper, screws...
OR			

Question	Answer	Marks	Guidance
3(a)	Accept any four additional specification points – used outdoors – water/rain proof. Withstand force of a football, needs to return ball accurately. Easy to carry, needs batteries for motor or manual power from force of ball. Safe to use – no sharp edges. [1 × 4]	4	Each specification point – 1 mark No repeats from question – include a target or goal, return the ball, fun for children, include a cartoon character... Only accept unqualified or one-word answers if relevant to this specific design problem such as colourful/high visibility/eye catching, strong/robust, portable/moveable, weatherproof/durable, stable, easy to clean, easy to store, easy to set up... Do not generic answers such as safe, lightweight,... Any other valid response
3(b)	Accept drawings of any two methods – use of spring, electric, pneumatic powered ram. Use of gravity fed shoot to direct football. Pivoted weight to strike ball. Use of compressed air. Rotating disc which picks ball up and then releases it 180 degrees. [2 × 2]	4	Maximum of 2 marks for each drawing: Mechanism – 1 mark Clear drawing – 1 mark Any other valid response Not ways a person will kick a football.
3(c)	Any three suitable ideas. Award up to 6 marks for communication of ideas using the 'Communication of ideas' table. Award up to 6 marks for suitable designs using the 'Suitable designs' table.	12	At least three different ideas for maximum marks. Pro rata if fewer.
3(d)	Award up to 6 marks for evaluation of the ideas: Evaluation [2 × 3] e.g. Advantage + disadvantage explained for each idea Selection [1] Justification[1]	8	Simple 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 the response includes sophisticated reasoning.

Question	Answer	Marks	Guidance
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	Additional detail dimensions might show thickness of materials, diameters, etc.
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</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>
3(g)	Accept any suitable manufacturing process. [1 × 1]	1	Process must be appropriate for design in (e) .
	Award up to 3 marks for description of process.	3	Detailed description for 3 marks
	Award up to 2 marks for names of tools, equipment of machines used.	2	<p>Basic marking out tools, such as pencil or rule, or just drawings of tools/equipment = 1 mark only</p> <p>Not materials or resources such as PVA, glasspaper, screws...</p>