



Cambridge IGCSE™

DESIGN & TECHNOLOGY

0445/12

Paper 1 Product Design

October/November 2021

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 2021 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.

Communication of ideas

	Mark	Performance description
Part (c)	5–6	Ideas are communicated with precision and clarity through the use of sketches/accurate drawings and reasoned annotations linked to most of the requirements.
	3–4	Ideas are displayed with some clarity through sketches/clear drawings supported by annotations referring to some of the requirements.
	1–2	Simple sketches/drawings and limited annotations show little understanding of the requirements.
	0	No creditable response.

Suitable designs

	Mark	Performance description
Part (c)	5–6	Creative solutions which fully meet the requirements. Designs showing most aspects of construction detail.
	3–4	Sensible solutions that mostly meet the requirements. Designs with moderate construction detail.
	1–2	Solutions do not meet many of the requirements. Simplistic designs with little construction detail.
	0	No creditable response

Quality of drawing

	Mark	Performance description
Part (e)	4	High standard of line quality, use of colour and proportions. Appropriate techniques used that show clearly all detail.
	2–3	Good line quality, use of colour and proportions. Most of the detail presented.
	1	Poor line quality and proportions. Little detail presented.
	0	No creditable response.

Construction details

	Mark	Performance Description
Part (e)	5–6	All construction detail clear with good annotations and/or additional detail drawings as necessary.
	3–4	Most construction may be obvious from overall views or with some annotation.
	1–2	A simplistic design; little or no detail of construction used.
	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 – adjustable to any angle, easy to move around, mobile phone does not fall out, does not scratch the mobile phone, allows button to be pressed when stand is in use, smooth edges, does not obscure speaker, screen, power cables, buttons ... must not slip, adjustable, stable. [1 × 4]	4	Each specification point – 1 mark No repeats from question – desktop stand, supported at an angle, hold a mobile phone, folds flat. Only accept unqualified answers (even if only word) if relevant to this specific design problem, not generic answers such as safe, lightweight, strong, nice ... Any other valid response
1(b)	Accept drawings of any two methods of supporting an object – articulated stand, easel style, picture frame style, blocks of materials shaped at an angle. Innovative methods of supporting an object. [2 × 2]	4	Maximum of 2 marks for each drawing: Method (named or notes describe) – 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 – not single words, or generic terms such as the best, meets the specification or most suitable. [1]	8	Simple description 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.

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)	Accept any suitable manufacturing process or evidence of an appropriate sequence of making. [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 or machines used.	2	Basic marking out tools, such as pencil or rule, or just drawings of tools/equipment = 1 mark only

Question	Answer	Marks	Guidance
OR			
2(a)	Accept any four additional specification points – displays mobile phone, identifies different features of the mobile phone, protects the mobile phone, easy to gain access to package, recyclable, attractive, allow contents of package to be seen. [1 × 4]	4	Each specification point – 1 mark No repeats from question – novel packaging, called ‘anywhere in the world’, for a new mobile phone, reflects the name. Only accept unqualified answers (even if only word) if relevant to this specific design problem, not generic answers such as safe, strong, portable, lightweight, nice ... Any other valid response
2(b)	Accept drawings of any two methods – use of plastic sheet insert, various methods identified for example window or plastic sheet as integral part of packaging, articulated package which reveals the phone, opening/‘cutouts’ [2 × 2]	4	Maximum of 2 marks for each drawing: Methods (named or notes describe) – 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 – not single words, or generic terms such as the best, meets the specification or most suitable. [1]	8	Simple description 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.

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>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 or evidence of an appropriate sequence of making. [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 or machines used.	2	Basic marking out tools, such as pencil or rule, or just drawings of tools/equipment = 1 mark only

Question	Answer	Marks	Guidance
OR			
3(a)	Accept any four additional specification points – avoids vibration when videoing, protect from sun/weather, allow buttons etc to be accessed, mustn't rust or deteriorate in weather, locked in position, weatherproof, lightweight, aerodynamic, robust. [1 × 4]	4	Each specification point – 1 mark No repeats from question – used by a cyclist, video a journey, attaches to a bicycle, holds a mobile phone securely, can be adjusted to different angles Only accept unqualified answers (even if only word) if relevant to this specific design problem, not generic answers such as safe, strong, nice ... Any other valid response
3(b)	Accept drawings of any two ideas, including circular clamp, use of wing nuts, nuts and bolts, jubilee clips, cable ties, lever locking system, straps, Velcro, end of handlebars, front forks or other idea. [2 × 2]	4	Maximum of 2 marks for each drawing: Method (named or notes describe) – 1 mark Clear drawing – 1 mark Any other valid response
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 – not single words, or generic terms such as the best, meets the specification or most suitable. [1]	8	Simple description 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.

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 or evidence of an appropriate sequence of making. [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 or machines used.	2	Basic marking out tools, such as pencil or rule, or just drawings of tools/equipment = 1 mark only