CAMBRIDGE
International Education

# Cambridge IGCSE™

**DESIGN AND TECHNOLOGY** **0445/13**

Paper 1 Product Design **May/June 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 May/June 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.



 **[Turn over**

**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.

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|---|
| GENERIC MARKING PRINCIPLE 5:<br><br>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:<br><br>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. Suitable responses may include:<br>easy to identify the tools, tools easily removed and replaced, does not damage the tools, tools securely fixed so they do not fall, secure wall fixture, sharp tools protect the user from cuts, easy to see where the tools are replaced after use, etc.<br>[1×4] | **4** | Each specification point – 1 mark<br><br>No repeats from question – used in workshops, store hand tools/components, make the hand tools components accessible, wall-mounted, adjustable (can be modified), hold a variety of tools or allow more tools/components to be added.<br><br>Only accept unqualified or one-word answers if relevant to this specific design problem – durable, strong, securely attached, easy to clean, no sharp corners, stable, sturdy<br><br>Do **not** accept one-word generic answers such as safe, lightweight, nice, waterproof, portable, hygienic<br><br>Any other valid response |
| 1(b) | Accept drawings of any **two** methods of **temporarily** attaching tools such as:<br>spring clips, pegs, shaped holes, open containers for small items, magnetic plates, quick release straps,<br>Velcro straps, etc.<br>[2×2] | **4** | Maximum of 2 marks for each response:<br>Notes/labels/arrows showing method – 1 mark<br>Clear drawing – 1 mark<br><br>**Not** double-sided tape.<br>Do **not** award marks for answers that show how to attach the wall unit to the wall.<br><br>Any other valid response |
| 1(c) | Any **three** suitable ideas.<br><br>Award up to **6 marks for communication of ideas** using the 'Communication of ideas' table.<br><br>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.<br><br>If the unit is floor standing, rather than wall mounted, do not award the top mark for 'Suitability'. |

| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 1(d) | Award up to **6 marks for evaluation** of the ideas:<br><br>Evaluation [2×3]<br>e.g. Advantage + disadvantage explained for each idea<br><br>Selection [1]<br>Justification – **not** single words, or generic terms such as the best, meets the specification or most suitable [1] | **8** | Simple descriptions or repeats of same points for each idea not rewarded.<br>Specific not generic justification.<br><br>Award maximum marks if only either advantage or disadvantage given for each as long as includes sophisticated reasoning. |
| 1(e) | Award up to **4 marks for quality of drawing** using the 'Quality of drawing' table.<br><br>Award up to **2 marks for dimensions:**<br><br>2 or 3 overall dimensions only [1]<br>Additional detail dimensions [1]<br><br>Award up to **6 marks for construction detail** using the 'Construction details' table. | **12** | Additional detail dimensions might show thickness of materials, diameters, etc. |
| 1(f) | Accept any **two** suitable **specific** materials. [1×2]<br><br>Accept any **appropriate** reason for choice of **each** material [1×2] | **4** | Each suitable specific material – 1 mark<br>Generic terms such as wood, metal, plastic **not** accepted.<br><br>Appropriate reason for each material – 1 mark<br>Materials must be appropriate for the design shown in **(e)** |
| 1(g) | Accept any suitable manufacturing process. [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. Suitable responses may include:<br>package can be hung up, fixing method needs to be tamperproof and secure, pliers must be fully visible while attached to the package, instructions for use must be clearly presented, package must be eye catching<br>[1×4] | **4** | Each specification point – 1 mark<br><br>No repeats from question – for new tools (sizes of tools), allows customers to hold/operate the tool without removing from package or shows tools common functions.<br><br>Only accept unqualified or one-word answers if relevant to this specific design problem – recyclable, low cost, attractive/attracts customers, aesthetic, lightweight, provide protection, securely hold tool, able to be opened and closed, no sharp edges, will not tear, convenient to use...<br><br>Do **not** accept one-word generic answers such as safe, strong, nice, waterproof, weatherproof, stable, portable...<br>Any other valid response |
| 2(b) | Accept drawings of any **two** methods of securing the pliers to the package such as:<br>clear vacuum formed cage (blister pack), wire fixture, plastic cable ties, plastic fixture, etc.<br>[2×2] | **4** | Maximum of 2 marks for each drawing:<br>Notes/labels/arrows showing method – 1 mark<br>Clear drawing – 1 mark<br><br>Do **not** award marks for sketches and notes that show how to attach the package to a rack.<br><br>Any other valid response |
| 2(c) | Any **three** suitable ideas.<br><br>Award up to **6 marks for communication of ideas** using the 'Communication of ideas' table.<br><br>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. |

| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 2(d) | Award up to **6 marks for evaluation** of the ideas:<br><br>Evaluation [2×3]<br>e.g. Advantage + disadvantage explained for each idea<br><br>Selection [1]<br>Justification – **not** single words, or generic terms such as the best, meets the specification or most suitable [1] | **8** | Simple descriptions or repeats of same points for each idea not rewarded.<br>Specific not generic justification.<br><br>Award maximum marks if only either advantage or disadvantage given for each as long as includes sophisticated reasoning. |
| 2(e) | Award up to **4 marks for quality of drawing** using the 'Quality of drawing' table.<br><br>Award up to **2 marks for dimensions:**<br><br>2 or 3 overall dimensions only [1]<br>Additional detail dimensions [1]<br><br>Award up to **6 marks for construction detail** using the 'Construction details' table. | **12** | Additional detail dimensions might show thickness of materials, diameters, etc. |
| 2(f) | Accept any **two** suitable **specific** materials. [1×2]<br><br>Accept any **appropriate** reason for choice of **each** material [1×2] | **4** | Each suitable specific material – 1 mark<br>Generic terms such as wood, metal, plastic **not** accepted.<br><br>Appropriate reason for each material – 1 mark<br>Materials must be appropriate for the design shown in **(e)** |
| 2(g) | Accept any suitable manufacturing process. [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. Suitable responses may include:<br>must not damage the materials, adjustable for different thicknesses, can be operated one handed, easily unclamped, pressure adjustable, comfortable and safe to operate, etc.<br>[1×4] | **4** | Each specification point – 1 mark<br><br>No repeats from question – used when cutting and shaping materials, hold material securely, used on a workbench, bench-mounted or temporarily hold materials on a flat surface.<br><br>Only accept unqualified or one-word answers if relevant to this specific design problem – durable, robust, easy to operate/use, strong, hard wearing, adjustable...<br><br>Do **not** accept one-word generic answers such as safe, lightweight, nice, hard, aesthetic...<br><br>Any other valid response |
| 3(b) | Accept drawings of any **two** methods of mechanically holding materials to a surface – cam locks, levers and linkages, lever locks, screw threads, cantilever mechanisms, peg with springs, etc.<br>[2×2] | **4** | Maximum of 2 marks for each drawing:<br>Notes/labels/arrows showing method – 1 mark<br>Clear drawing – 1 mark<br><br>Any other valid response |
| 3(c) | Any **three** suitable ideas.<br><br>Award up to **6 marks for communication of ideas** using the 'Communication of ideas' table.<br><br>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. |

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