



## Cambridge IGCSE™

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DESIGN & TECHNOLOGY

0445/13

Paper 1 Product Design

October/November 2021

MARK SCHEME

Maximum Mark: 50

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**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.

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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**

	<b>Mark</b>	<b>Performance description</b>
<b>Part (c)</b>	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**

	<b>Mark</b>	<b>Performance description</b>
<b>Part (c)</b>	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**

	<b>Mark</b>	<b>Performance description</b>
<b>Part (e)</b>	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**

	<b>Mark</b>	<b>Performance Description</b>
<b>Part (e)</b>	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 <b>four</b> additional specification points – low friction on moving parts/comfortable to sit on/safe for young children/ durable with children/adjustable for different sizes/does not slip on ground/not too heavy. [1 × 4]	<b>4</b>	Each specification point – 1 mark  No repeats from question – children need to enjoy, sit-on, suitable for a three to four-year-old child, child can sit astride, able to be steered.  Only accept unqualified answers (even if only word) if relevant to this specific design problem, <b>not</b> generic answers such as safe, strong, nice ... Any other valid response
1(b)	Accept drawings of any <b>two</b> steering methods – direct drive from column to axle/steering wheel/ handlebars/gear systems/chain or cord systems. [2 × 2]	<b>4</b>	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 <b>three</b> suitable ideas.  Award up to <b>6 marks for communication of ideas</b> using the 'Communication of ideas' table.  Award up to <b>6 marks for suitable designs</b> using the 'Suitable designs' table.	<b>12</b>	At least <b>three different</b> ideas for maximum marks. Pro rata if fewer.
1(d)	Award up to <b>6 marks for evaluation</b> of the ideas:  Evaluation [2 × 3] e.g. Advantage + disadvantage explained for each idea  Selection [1]  Justification – <b>not</b> single words, or generic terms such as the best, meets the specification or most suitable [1]	<b>8</b>	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.

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

Question	Answer	Marks	Guidance
<b>OR</b>			
2(a)	Accept any <b>four</b> additional specification points – has impact/ invites people to play/no driving experience required/easy to manipulate/looks realistic/stated number of players. [1 × 4]	<b>4</b>	Each specification point – 1 mark No repeats from question – helps navigate, used for different types of roads, suitable for teenagers, helps understanding of junctions.  Only accept unqualified answers (even if only word) if relevant to this specific design problem, <b>not</b> generic answers such as safe, strong, nice... Any other valid response
2(b)	Accept drawings of any <b>two</b> modelling methods – vacuum formed/injection moulded/card outlines/solid wood/metal. [2x2]	<b>4</b>	Maximum of 2 marks for each drawing: Method (named or notes describe) – 1 mark Clear drawing – 1 mark Any other valid response
2(c)	Any <b>three</b> suitable ideas.  Award up to <b>6 marks for communication of ideas</b> using the 'Communication of ideas' table.  Award up to <b>6 marks for suitable designs</b> using the 'Suitable designs' table.	<b>12</b>	At least <b>three different</b> ideas for maximum marks. Pro rata if fewer.
2(d)	Award up to <b>6 marks for evaluation</b> of the ideas:  Evaluation [2 × 3] e.g. Advantage + disadvantage explained for each idea  Selection [1] Justification - <b>not</b> single words, or generic terms such as the best, meets the specification or most suitable [1]	<b>8</b>	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.

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



Question	Answer	Marks	Guidance
<b>OR</b>			
3(a)	Accept any <b>four</b> additional specification points – simple to operate/easy to replace elastic band/non-toxic materials/rounded (safe) shape/no small parts/moving feature stated. [1 × 4]	<b>4</b>	Each specification point – 1 mark No repeats from question – more interesting, involves movement, propelled by elastic band, have an additional moving feature.  Only accept unqualified answers (even if only word) if relevant to this specific design problem, <b>not</b> generic answers such as safe, strong, nice ... Any other valid response
3(b)	Accept drawings of any <b>two</b> methods of producing rotational movement from elastic band – direct drive on to axle/use of gear system/belt and pulley system/rack and pinion/stretch the elastic band and release [2 × 2]	<b>4</b>	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 <b>three</b> suitable ideas.  Award up to <b>6 marks for communication of ideas</b> using the 'Communication of ideas' table.  Award up to <b>6 marks for suitable designs</b> using the 'Suitable designs' table.	<b>12</b>	At least <b>three different</b> ideas for maximum marks. Pro rata if fewer.
3(d)	Award up to <b>6 marks for evaluation</b> of the ideas:  Evaluation [2 × 3] e.g. Advantage + disadvantage explained for each idea  Selection [1] Justification – <b>not</b> single words, or generic terms such as the best, meets the specification or most suitable [1]	<b>8</b>	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.

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