Cambridge Assessment International Education

Cambridge International AS & A Level

DESIGN & TECHNOLOGY **9705/12**

Paper 1 **October/November 2021**

MARK SCHEME

Maximum Mark: 120

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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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.

Section A

Question	Answer	Marks	Guidance
1(a)	Exemplar answers Available in a range of colours [1] Heat resistant [1] Readily available material [1] No surface finish required [1] Water resistant [1] **0–2**	**2**	AOVR
1(b)(i)	Sketches and/or notes show: Appropriate method of marking out and cutting to shape [0–3] Suitable joint e.g. lap joint or dovetail joint [1] Marking out [1] Cutting out [1] Tools, equipment or processes [0–2] Pencil, rule, accuracy [1] Suitable method e.g. use of tenon saw [1] Safety precaution [0–1] Suitable methods eye protection, hair tied back, fingers clear, work clamped **0–6**	**6**	Accept hand or CNC methods.

Question	Answer	Marks	Guidance
1(b)(ii)	Sketches and/or notes show: Appropriate method of marking out and cutting to shape [0–3] Suitable joint e.g. method drill hole and cut vertical lines [1] Marking out [1] Cutting out [1] Tools, equipment or processes [0–2] Pencil, rule, accuracy [1] Suitable method e.g. use of tenon saw [1] Safety precaution [0–1] Suitable methods eye protection, hair tied back, fingers clear, work clamped **0–6**	**6**	Accept hand or CNC methods.
1(c)	Sketches and/or notes show: Suitable method identified for adding the lettering e.g. memory technique [1] Description of method [0–3] Tools and/or equipment named [0–2] **0–6**	**6**	Accept hand or CNC methods.

Question	Answer	Marks	Guidance
2(a)	Accept 150–165 mm [1] × 215 mm–230 mm [1] **0–2**	**2**	Accept C5 (229 mm × 162 mm).
2(b)(i)	Sketches and/or notes show: Appropriate method of marking out and cutting to shape [0–3] Suitable joint e.g. drawing the image with the stencil [1] Repeating images for quantity [1] Suitable method of cutting out [1] Tools, equipment or processes [0–2] Pencil, rule, accuracy [1] Suitable method e.g. use of craft knife or scissors [1] Safety precaution [0–1] Suitable methods, hair tied back, fingers clear, work clamped **0–6**	**6**	Accept hand and CNC methods.
2(b)(ii)	Sketches and notes show: Appropriate method of marking out, cutting and joining [0–3] Marking out [1] Cutting out [1] Joining [1] Tools, equipment or processes [0–2] Pencil, rule, accuracy [1] Suitable method e.g. use of craft knife or scissors and double-sided tape[1] Safety precaution [0–1] Suitable methods, hair tied back, fingers clear, cutting away from user **0–6**	**6**	

Question	Answer	Marks	Guidance
2(c)	Sketches and/or notes show: Suitable software identified e.g. Word [1] Description of method e.g. use of tools such as insert [0–3] Tools and/or equipment named [0–2] **0–6**	**6**	

Question	Answer	Marks	Guidance
3(a)	Linear motion [1] Rotary motion [1] **0–2**	**2**	Accept reciprocating motion.
3(b)(i)	Sketches and/or notes show: Appropriate method of marking out, cutting/drilling and bending [0–3] Marking out [1] Cutting/drilling [1] Bending [1] Tools, equipment or processes [0–2] Scriber, rule, accuracy [1] Suitable method e.g. pillar drill, tap, heat and bend over an anvil, (accept bend cold). [1] Safety precaution [0–1] Suitable methods eye protection, hair tied back, fingers clear, work clamped **0–6**	**6**	Accept hand or CNC methods.

Question	Answer	Marks	Guidance
3(b)(ii)	Sketches and/or notes show: Appropriate method of cutting thread [0–3] Preparation – chamfer lead in on bar and lubricant [1] Cutting thread [2] Tools, equipment or processes [0–2] Suitable method e.g. die or lathe [1] Use of die stock and action of cutting thread [1] Safety precaution [0–1] Suitable methods eye protection, hair tied back, fingers clear, work clamped **0–6**	**6**	
3(c)	Sketches and/or notes show: Suitable method identified for batch production e.g. injection moulding [1] Description of method [0–3] Tools and/or equipment named [0–2] **0–6**	**6**	Accept CNC methods.

Section B

Question	Answer	Marks	Guidance
4(a)	Feature X covers/hides [1] the head of the screw [1] **0–2**	**2**	Also accept answers that relate to safety.
4(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. No padding on the seat [1] so it would be uncomfortable [1] **0–4**	**4**	Other acceptable answers include: • No straps • No lip to tray • Easily topple over
4(c)	Explanation of how problem one could be overcome [0–3] Explanation of how problem two could be overcome [0–3] e.g. add a cushion [1] filled with foam [1] and held in place with Velcro [1] **0–6**	**6**	
4(d)(i)	Situation has been analysed and relevant issues/points identified Benefits of mass production e.g. economies of scale [1] satisfies high demand for a product [1], faster production [1] **0–3**	**3**	
4(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g. tooling costs high but then costs per unit reduce [1], easy to make variations such as change the colour or size [1], machines capable of working very fast and for 24 hours a day [1] **0–3**	**3**	
4(d)(iii)	Specific examples/evidence used to support conclusions e.g. production of kitchen cabinets largely automated [1], cabinets made to the same design but finish (colour, material …) changed [1] **0–2**	**2**	

Question	Answer	Marks	Guidance
5(a)	Feature X is a hole in the package [1] on a rack [1] **0–2**	**2**	The hole may be referred to as a Euroslot.
5(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. handles not shaped [1] so difficult to hold [1] **0–4**	**4**	Other acceptable problems include: • Brushes will fall out • No graphics • Lacks perforation or opening to aid easy access to brushes • Paintbrushes are all the same size, • Can't see the size of the brushes behind.
5(c)	Explanation of how problem one could be overcome [0–3] Explanation of how problem two could be overcome [0–3] e.g. ergonomically shape /round [1] the handles [1] so they are comfortable to hold [1] **0–6**	**6**	
5(d)(i)	Situation has been analysed and relevant issues/points identified e.g. low cost packaging [1], product, not packaging, the focus [1] emphasis on instructions/information [1] **0–3**	**3**	
5(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g. customers [1] need information [1] to be able to use the product safely. [1] **0–3**	**3**	
5(d)(iii)	Specific examples/evidence used to support conclusions e.g. car parts packaged in a corrugated card box [1], with label giving details of the product [1] **0–2**	**2**	

Question	Answer	Marks	Guidance
6(a)	Feature X is a strap/handle [1] for carrying the torch [1] **0–2**	**2**	
6(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. Lens hole very small[1] so beam will be narrow [1] **0–4**	**4**	Other acceptable answers include: • No switch • No grip on body • No means of changing battery or lamp
6(c)	Explanation of how problem one could be overcome [0–3] Explanation of how problem two could be overcome [0–3] e.g. Increase the size [1] the lens [1] to make a larger beam of light [1] **0–6**	**6**	
6(d)(i)	Situation has been analysed and relevant issues/points identified e.g. batteries run flat [1] batteries difficult to recycle due to toxic chemicals [1] batteries take up a lot of space [1] **0–3**	**3**	
6(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g. rechargeable batteries [1], pollution caused by toxic chemicals [1], solar powered products [1] **0–3**	**3**	
6(d)(iii)	Specific examples/evidence used to support conclusions e.g. wind up radio [1], dynamo on cycle light [1] **0–2**	**2**	

Section C

Question	Answer	Marks	Guidance
7(a)	**Game** One pre-conceived idea presented **0–4** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **5–8** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **9–12** **Use of three ball bearings must be included to access 10–12 marks** Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	
7(b)	**Case** One pre-conceived idea presented **0–4** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **5–8** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **9–12** **Must be able to be carried to access 10–12 marks** Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	

Question	Answer	Marks	Guidance
7(c)	**Holds six ball bearings** One pre-conceived idea presented **0–4** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **5–8** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **9–12** **Must attach to the carry case to access 10–12 marks** Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	
7(d)	The drawing will exhibit a reasonable standard of outcome and show some of the required design features **0–5** OR The drawing will exhibit a good standard of outcome and show most of the design features required to make the product function as intended **6–9** OR The drawing will be completed to a high standard of outcome and fully show the design features required to make the product function as intended **10–14** Some use made of colour and tone to enhance the visual impact of the drawing **0–2** OR Good use has been made of colour and tone to enhance the visual impact of the drawing **3–4** OR Very good use has been made of colour, tone and material representation to enhance the visual impact of the drawing **5–6**	**20**	

Question	Answer	Marks	Guidance
8(a)	**Painting book** One pre-conceived idea presented **0–4** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **5–8** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **9–12** **Animal shapes must be included to access 10–12 marks** Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	
8(b)	**Holder design** One pre-conceived idea presented **0–4** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **5–8** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **9–12** **Must hold six pots of paint and a brush to access 10–12 marks** Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	**n**

Question	Answer	Marks	Guidance
8(c)	**Environmentally friendly package that is easy to carry** One pre-conceived idea presented **0–4** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **5–8** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **9–12** **Must hold painting book, six pots of paint and a brush to access 10–12 marks** Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	
8(d)	The drawing will exhibit a reasonable standard of outcome and show some of the required design features **0–5** OR The drawing will exhibit a good standard of outcome and show most of the design features required to make the product function as intended **6–9** OR The drawing will be completed to a high standard of outcome and fully show the design features required to make the product function as intended **10–14** Some use made of colour and tone to enhance the visual impact of the drawing **0–2** OR Good use has been made of colour and tone to enhance the visual impact of the drawing **3–4** OR Very good use has been made of colour, tone and material representation to enhance the visual impact of the drawing **5–6**	**20**	

Question	Answer	Marks	Guidance
9(a)	**Method of joining top and base** One pre-conceived idea presented **0–4** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **5–8** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **9–12** **Allows candle to be seen must be included to access marks 10–12** Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	
9(b)	**Fastens lamp to ceiling** One pre-conceived idea presented **0–4** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **5–8** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **9–12** **Height of lamp must be adjustable to access 10–12 marks** Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	

Question	Answer	Marks	Guidance
9(c)	**Ergonomic handle** One pre-conceived idea presented **0–4** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **5–8** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **9–12** **Must fasten to base of lamp to access 10–12 marks** Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	
9(d)	The drawing will exhibit a reasonable standard of outcome and show some of the required design features **0–5** OR The drawing will exhibit a good standard of outcome and show most of the design features required to make the product function as intended **6–9** OR The drawing will be completed to a high standard of outcome and fully show the design features required to make the product function as intended **10–14** Some use made of colour and tone to enhance the visual impact of the drawing **0–2** OR Good use has been made of colour and tone to enhance the visual impact of the drawing **3–4** OR Very good use has been made of colour, tone and material representation to enhance the visual impact of the drawing **5–6**	**20**	