Cambridge Assessment International Education

Cambridge International A Level

DESIGN & TECHNOLOGY **9705/32**

Paper 3 **October/November 2022**

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 2022 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.

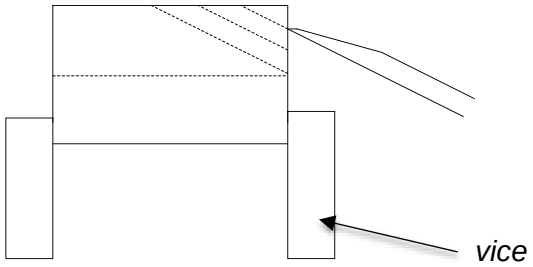
GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

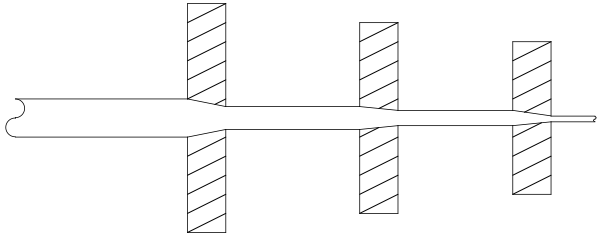
Question	Answer	Marks	Guidance
Section A Part A – **Product Design**			
1(a)	suitable material: • abs/polypropylene/acrylic/HIPS/GRP • beech, maple, ash or attractive grain hardwood • aluminium alloy, stainless steel reasons: • can be manufactured to required shape • will look attractive on table any other reason appropriate to material choice	**3**	

Question	Answer	Marks	Guidance
1(b)	quality of description: • fully detailed all/most stages 4–7 • some detail, 0–3 • quality of sketches up to 2	**9**	*Dependant on material chosen –* *<u>Laminated</u>* *prepare former* *cut hardwood veneers* *glue veneers, cramp in former* *when set, shape, drill and finish* *<u>Steam bent</u>* *suitable hardwood, ash, beech or maple cut to size* *steam hardwood for required time* *bend using former* *shape and finish* *<u>Thermoforming</u>* *ABS, polypropylene, HIPS, acrylic* *cut to shape, drill or securely drill after thermoforming* *thermoform using former* *polished finish* *<u>Forming metal</u>* *Aluminium, stainless steel* *cut to shape* *drilled or drill after forming* *form using former or bending jig* *finish.*

Question	Answer	Marks	Guidance
1(c)	explanation could include: • change in process; • change in materials; • use of templates, jigs, formers, moulds; • simplification of design. quality of explanation: • logical, structured 4–6 • limited detail, 0–3 • quality of sketches up to 2	**8**	

Question	Answer	Marks	Guidance
2	discussion could include: • ways of gauging public opinion • environmental/sustainability concerns • cost implications • manufacturing comparison examples/evidence could be • specific reference to product chosen • specific appropriate manufacturing methods • specific public concern/opinion examination of issues • wide range of relevant issues 4–8 • limited range 0–3 quality of explanation • logical, structured 4–8 • limited detail, 0–3 supporting examples/evidence 4	**20**	<u>*Seating for outdoor public spaces*</u> • *cost to community* • *encourage community spirit* • *could encourage gatherings/noise* • *visual impact* • *safety and reliability* <u>*Drinking straws*</u> • *reusable or sustainable resources* • *litter* • *material choice determines manufacturing method* • *cost implications* <u>*Shopping bags*</u> • *necessity* • *material choice/environmental concerns* • *reusable or limited life* • *advertising feature*

Question	Answer	Marks	Guidance
3(a)	description of process • fully detailed, all/most stages 3–5 • some detail, 0–2 quality of sketches up to 2 2 × **7**	**14**	<u>*Dip coating*</u> *Using fluidised bed (powder)* • *air is blown through the powder from the bottom of the fluidising bed* • *plate rack preheated to suit the thickness of material and dipped into the bed* • *plastic melts and coats the surface* • *when sufficient thickness achieved remove and allow to cool, check the finish* *Using liquid vinyl (plastisol)* • *plate rack cleaned and preheated* • *dipped into liquid vinyl, the hotter the heating of the plate rack and the length of time in the dip determines the thickness of coating.* • *remove from dip, cool and check the finish.* <u>*Cross halving joint*</u> *prepare pieces of wood to size* *Mark out position and depth of joint* *Cut on waste side of line one each piece* *Use chisel with mallet to remove waste*  *vice* *Turn piece in the vice to chisel from other side and cut to depth* *Test joint – adjust- fit*

Question	Answer	Marks	Guidance
3(a)			*Drawing* • *place copper rod in machine* • *taper (draw down) the end of rod to fit into first die* • *secure end of tapered rod* • *heat along join until correct temperature* • *apply welding rod* • *leave to cool to pull through die to reduce Diameter* • *use required number of dies to achieve desired diameter* 
3(b)	dip coating • even smooth surface • range of colours • difficult and complex shapes can be quickly coated cross-halving joint • strong and relatively quick to cut joint • lots of gluing area • clean finish, no end grain showing drawing • accurate, regular section • grain structure compressed, strengthens the wire • quick process 2 × **3**	**6**	

Question	Answer	Marks	Guidance
Part B – **Practical Technology**			
4(a)	Description could include: • strength benefits • weight • production methods • streamlining/aesthetics quality of description • fully detailed, logical, well structured. 8–10 • some detail, structured 4–7 • limited detail, 1–3 • no creditable response 0	**10**	*<u>Aluminium alloy</u>* *Lightweight, not too expensive, relatively easy to manufacture, can suffer stress cracks, difficult to repair.* *<u>Carbon fibre</u>* *Can be moulded into any shape, expensive, tough, lightweight* *<u>Steel</u>* *Modern production has lighter frames than the heavier older versions, easy to manufacture, less expensive, easily repaired* *<u>Titanium</u>* *Exceptionally strong and light, difficult to machine and weld, very expensive*
4(b)	explanation could include: • specific manufacturing processes • how are they faster • comparisons with former methods quality of explanation: • detailed, logical, structured 5–8 • limited detail, 0–4 valid example well described and referenced 2	**10**	*Detailed reference to processes such as injection moulding, laser cutting and 3D printing, die casting*

Question	Answer	Marks	Guidance
5(a)	input devices could be • mouse • joystick • graphics tablet output devices could be • printer/plotter • CNC machine • screen/monitor 2 × **2**	**4**	
5(b)	quality of explanation: for each correct device • detailed, logical, structured 3–4 • limited detail, 0–2 4 × **4**	**16**	*For each, detailed description of device and how they are used in the designing and making for full marks.*

Question	Answer	Marks	Guidance
6	discussion could include: • types of products that are self-assembled • skills required • transporting products • customisation • cost benefits examples/evidence could be • specific reference to self-assembled products • specific appropriate self-assembly methods • problems encountered examination of issues • wide range of relevant issues 4–8 • limited range 0–3 quality of explanation • logical, structured 4–8 • limited detail, 0–3 supporting examples/evidence 4	**20**	*<u>Implications to manufacturer</u>* *reduced storage requirement* *reduced manufacturing processes* *predominantly automated, reduced workforce,* *use of standardised parts/components* *<u>Implications to consumer</u>* *easier to take home* *self-assembled gives some a greater feeling of ownership* *ability to customise* *cost benefits*

Question	Answer	Marks	Guidance
Part C – **Graphic Products**			
7	correct drawing/scale 2 window 2 door 1 sink, sink unit and mirror 4 cabinet 2 bath 4 shower tray 3 overall line quality 2	**20**	

Question	Answer	Marks	Guidance
8(a)	appropriate set up of tables 2 appropriate set up of display boards 2 appropriate circulation of visitors 2 protection of equipment 2 Quality of communication up to 2 for clear communication	**10**	
8(b)	appropriate symbol clearly drawn 3–4 basic outline of symbol 0–2	**4**	
8(c)	quality of description: • fully detailed all/most stages described 4–6 • some detail, 0–3	**6**	*could be:* *<u>inkjet or laser printed</u>* *include details of master copy checked in preview, quality of print and folding template/method* *<u>photocopied</u>* *include details of high-quality master copy, photocopy print quality and set up, and folding template/method*

Question	Answer	Marks	Guidance
9	discussion could include: • specifics of roles of engineers and architects • structural safety • aesthetic qualities • legislative issues • response to needs of individuals/community examples/evidence could be • specific reference to engineers/architects • specific reference to their work/buildings/structures • public/personal reaction examination of issues • wide range of relevant issues 4–8 • limited range 0–3 quality of explanation • logical, structured 4–8 • limited detail, 0–3 supporting examples / evidence 4	**20**	

Question	Answer	Marks	Guidance
Section B			
10,11 and 12	**Analysis** Analysis of the given situation/problem. **[0–5]** Detailed written specification of the design requirements. At least five specification points other than those given in the question. **[0–5]** **Exploration** B Bold sketches and brief notes to show exploration of ideas for a design solution, with reasons for selection. range of ideas **[0–5]** annotation related to specification **[0–5]** marketability, innovation **[0–5]** evaluation of ideas, selection leading to development **[0–5]** communication **[0–5]** **Development** Bold sketches and notes showing the development, reasoning and composition of ideas into a single design proposal. Details of materials, constructional and other relevant technical details. developments **[0–5]** reasoning **[0–5]** materials **[0–3]** constructional detail **[0–7]** communication **[0–5]** **Proposed solution** Produce drawing/s of an appropriate kind to show the complete solution. proposed solution **[0–10]** details/dimensions **[0–5]** **Evaluation** Written evaluation of the final design solution. **[0–5]**	**80**	